The Institute of Physics and
The Physical Society

physics bulletin

Edited by C I Pedersen, FIL, MIPR

Volume 21 1970

Headquarters
47 Belgrave Square, London SW1
London Publishing Office
1 Lowther Gardens, Prince Consort Road, London SW7

The Institute of Physics and The Physical Society

Officers and Members of Council 1970–71

President

J W Menter, Ph D, Sc D, F Inst P, FRS

Immediate Past President

M R Gavin, CBE, D Sc, FIEE, F Inst P

Vice Presidents

B R Coles, D Phil

A E De Barr, B Sc, F Inst P

S F Edwards, Ph D, FIMA, F Inst P, FRS

C A Hogarth, Ph D, F Inst P

Honorary Treasurer

P T Menzies, MA, F Inst P

Honorary Secretary

R Press, CBE, Ph D, F Inst P

Ordinary Members of Council

A G Gaydon, D Sc, F Inst P, FRS

P B Hirsch, Ph D, F Inst P, FRS

A J Kennedy, D Sc, MIEE, FIM, F Inst P

N Kurti, Dr Phil, F Inst P, FRS

E Laverick, Ph D, FIEE, F Inst P

J E Roberts, D Sc, F Inst P

H Rose, Ph D, F Inst P

C A Taylor, Ph D, D Sc, F Inst P

Representing Branches

H W Wilson, Ph D, F Inst P, FRSE

B Yates, Ph D, F Inst P

Permanent Officers

Secretary

L Cohen, Ph D, F Inst P

Assistant Secretary

P L Flowerday, B Sc, A Inst P

Administrative Officers

Miss D G Mayston

N A Walter, MA, A Inst P

Finance Officer R H Mason

Meetings Officer L Lawrence

Registrar R G Roberts, BA

Managing Editor C I Pedersen, FIL, MIPR

Executive Editor D G Fisher, Ph D, F Inst P

Head of Sales Promotion and Distribution

M J Grover, B Sc

Advertisement Manager S Sadler

Production Manager

P E Lafferty, M Sc, PCE, Grad Inst P

Assistant Editors

Miss H Carcas

G P Copp, B Sc

Miss S Johns, B Sc

K F G Paulus, Ph D, A Inst P

P A Tulett

The Institute of Physics and The Physical Society

47 Belgrave Square, London SW1 (01–235 6111). GIRO account No 544 8158

Bristol Publishing Office

Netherton House, 23–29 Marsh Street Bristol BS1 4BP (Telex 449149)

London Publishing Office

1 Lowther Gardens, Prince Consort Road London SW7 (01–589 0048)

Honorary Officers of Sub-Committees of the Meetings Committee, Groups and Branches of The Institute of Physics and The Physical Society

ATOMIC AND MOLECULAR PHYSICS SUB-COMMITTEE *Chairman* Prof G W Series *Hon Secretary* Dr K Dolder, Dept of Atomic Physics, School of Physics, The University, Newcastle upon Tyne NE1 7RU

NUCLEAR PHYSICS SUB-COMMITTEE *Chairman* Prof L L Green, F Inst P *Hon Secretary* Dr J S C McKee, F Inst P, Dept of Physics, University of Birmingham, PO Box 363, Birmingham 15

PHYSICS IN INDUSTRY SUB-COMMITTEE *Chairman* Dr P Schagen, OBE, F Inst P *Hon Secretary* Dr J Thewlis F Inst P, The Mount, Ardentinny, By Dunoon, Argyll

SOLID STATE PHYSICS SUB-COMMITTEE *Chairman* Dr A B Lidiard, F Inst P *Hon Secretary* Dr C Hilsum, F Inst P, Royal Radar Establishment, St Andrews Road, Malvern, Worcs.

ACOUSTICS GROUP *Chairman* Dr J J Knight, F Inst P *Joint Hon Secretaries* J Blitz, F Inst P Dept of Physics, Brunel University, Woodlands Avenue, London W3 G H Vulkan, F Inst P GLC Scientific Branch, County Hall, London SE1

ATOMIC COLLISIONS IN SOLIDS GROUP *Chairman* Prof M W Thompson, F Inst P *Hon Secretary* Dr J S Colligon, A Inst P, Dept of Electrical Engineering, The University, Salford M5 4WT

CARBON AND GRAPHITE GROUP *Chairman* D Bulgin, A Inst P *Hon Secretary* D V Badami A Inst P, Turner Brothers Asbestos Ltd, Rochdale, Lancs.

COMPUTATIONAL PHYSICS GROUP *Chairman* Dr K V Roberts, F Inst P *Hon Secretary* B McNamara A Inst P, UKAEA, The Culham Laboratory, Culham, Abingdon, Berks.

CRYSTALLOGRAPHY GROUP *Chairman* Dr G F Claringbull, A Inst P *Hon Secretary* Dr S C Wallwork F Inst P, Dept of Chemistry, The University, Nottingham NG7 2RD

EDUCATION GROUP *Chairman* A W Trotter, A Inst P *Hon Secretary* Dr R F Y Randall, F Inst P Lanchester Polytechnic, Eastlands, Rugby

ELECTRONICS GROUP *Chairman* Dr J Evans, F Inst P *Hon Secretary* I A Snowden, A Inst P GEC–AEI Hirst Research Centre, Wembley, Middx HA9 7PP

ELECTRON MICROSCOPY AND ANALYSIS GROUP *Chairman* Dr W C Nixon, F Inst P *Hon Secretary* Dr G R Booker, A Inst P, Dept of Metallurgy, University of Oxford, Parks Road, Oxford

LOW TEMPERATURE GROUP *Chairman* Dr B B Goodman *Hon Secretary* Dr P L Smith, F Inst P Ministry of Aviation Supply, Savoy Hill, London WC2

MAGNETISM GROUP *Chairman* J E Gould, F Inst P *Hon Secretary* Prof R R Birss, F Inst P Dept of Pure and Applied Physics, The University, Salford M5 4WT

MATERIALS AND TESTING GROUP *Chairman* F R Barsham, A Inst P *Hon Secretary* D A Leak, A Inst P, Dept of Metallurgy, University College, Singleton Park, Swansea SA2 8PP

OPTICAL GROUP *Chairman* Dr H G Jerrard, F Inst P *Hon Secretary* Dr K G Birch, Division of Optical Metrology, National Physical Laboratory, Teddington, Middx *Assistant Hon Secretary* A C Marchant, A Inst P, I and R Dept, Royal Aircraft Establishment, Farnborough, Hants.

PLASMA PHYSICS GROUP *Chairman* Dr R S Pease, F Inst P *Hon Secretary* Dr P A Davenport, F Inst P UKAEA, The Culham Laboratory, Culham, Abingdon, Berks.

POLYMER PHYSICS GROUP *Chairman* Prof L R G Treloar, OBE, F Inst P *Hon Secretary* Prof I M Ward, F Inst P, Dept of Physics, The University, Leeds 2

SPACE SCIENCE AND ASTROPHYSICS GROUP *Chairman* D F A Edwards, A Inst P *Hon Secretary* P D Dimmick, L Inst P, 25 Sandy Lane, Farnborough, Hants.

SPECTROSCOPY GROUP *Chairman* R J W Powell, L Inst P *Hon Secretary* D J Hobbs, L Inst P Spectrographic Research Dept, Johnson Matthey Chemicals Ltd, Orchard Road, Royston, Herts.

STATIC ELECTRIFICATION GROUP *Chairman* E L Zichy, A Inst P *Hon Secretary* Dr J C Gibbings A Inst P, Dept of Mechanical Engineering, The University, Liverpool L69 3BX

STRESS ANALYSIS GROUP *Chairman* K J Pascoe, F Inst P *Hon Secretary* Dr P Stanley, F Inst P Dept of Mechanical Engineering, The University, Nottingham NG7 2RD

THIN FILMS AND SURFACES GROUP *Chairman* Dr D W Pashley, F Inst P, FRS *Hon Secretary* Dr R M Hill, F Inst P, Dept of Physics, Chelsea College of Science and Technology, Pulton Place London SW6

VACUUM GROUP *Chairman* J Pollard, A Inst P *Hon Secretary* W Steckelmacher, F Inst P Central Research Laboratories, Edwards High Vacuum Ltd, Manor Royal, Crawley, Sussex

IRISH BRANCH *Chairman* Prof P K Carroll *Hon Secretary* Dr J E O'Connor, A Inst P St Luke's Hospital, High Field Road, Dublin 6, Eire

NEW ZEALAND BRANCH *Chairman* Prof D Walker, F Inst P *Vice-Chairman* K I Williamson, A Inst P *Hon Secretary* M A Collins, F Inst P, c/o Physics and Engineering Laboratory, Private Bag, Lower Hutt New Zealand

MALAYAN BRANCH *Chairman* Y S Hon, A Inst P

LANCASTER BRANCH *Chairman* J K Donoghue, F Inst P *Hon Secretary* Dr I J Saunders, A Inst P Dept of Physics, The University, Bailrigg, Lancaster

LIVERPOOL AND NORTH WALES BRANCH *Chairman* J Dawber, A Inst P *Hon Secretary* Dr G R Court, Oliver Lodge Laboratory, Oxford Street, PO Box 147, Liverpool L69 3BX

LONDON AND HOME COUNTIES BRANCH *Chairman* J G Scane, F Inst P *Hon Secretary* R G Birch, A Inst P, Peat, Marwick, Mitchell & Co, Austral House, Basinghall Avenue London EC2

MANCHESTER AND DISTRICT BRANCH *Chairman* Dr B Yates, F Inst P *Joint Hon Secretaries* Dr I H Munro, A Inst P, Dept of Physics, The Schuster Laboratory, The University, Manchester M13 9PL B W James, Grad Inst P, Dept of Pure and Applied Physics, The University, Salford M5 4WT

MIDLAND BRANCH *Chairman* Dr E G Stanford, F Inst P *Joint Hon Secretaries* Dr G G Matthews F Inst P, Lanchester Polytechnic, Eastlands, Rugby R F Coe, A Inst P, Joseph Lucas Ltd, Group Research Centre, Monkspath, Shirley, Solihull, Warwickshire

NORTH EASTERN BRANCH *Chairman* Dr H Rose, F Inst P *Hon Secretary* B Oakes, A Inst P Dept of Physics and Physical Electronics, Newcastle upon Tyne Polytechnic, Ellison Place Newcastle upon Tyne NE1 8ST

NORTH EASTERN SUB-BRANCH (Cumberland Area) *Chairman* J A Robson, F Inst P *Hon Secretary* J R Rowbotham, A Inst P, Reactor Development Laboratory, UKAEA Windscale, Seascale Cumberland

SCOTTISH BRANCH *Chairman* Prof H W Wilson, F Inst P *Hon Secretary* G M Somerville, A Inst P Dept of Physics, Paisley College of Technology, High Street, Paisley, Renfrewshire

SOUTH WALES BRANCH *Chairman* Dr W M Jones, F Inst P *Hon Secretary* Dr N H Saunders A Inst P, Dept of Physics, University College of Swansea, Singleton Park, Swansea SA2 8PP

SOUTH WESTERN BRANCH *Chairman* R T Jarman, A Inst P *Hon Secretary* N D C Harris, A Inst P School of Education, Bath University of Technology, Northgate House, Upper Borough Wall Bath BA1 5AL

YORKSHIRE BRANCH *Chairman* Prof M M Woolfson, F Inst P *Hon Secretary* Dr D A Davies, F Inst P Dept of Physics, The Polytechnic, Sheffield S1 1WB

Contents

January
News and comment 1
The electron ring accelerator by B W Montague 6
Physics in Scotland by C L Boltz 10
Uranium enrichment by D G Avery 17
The 1969 Nobel Prize in physics by R H Dalitz 22
Book reviews 29
Technology in brief by C L Boltz 31
Highlights of recent meetings 33
Letters to the editor 36
People and events 38
Coming events 43

February
News and comment 49
The 1970 Physics Exhibition by C L Boltz 64
Microelectronics by J R A Beale 60
The physicist at sea by G E R Deacon 66
Structure and properties of solid polymers by I M Ward 71
Book reviews 81
Letters to the editor 82
Institute and Society awards for 1970 84
People and events 86
Coming events 91
The register 95

March
News and comment 97
The student scene 102
High power pulsed lasers by D J Bradley 116
Book reviews 128
Technology in brief by C L Boltz 132
Letters to the editor 134
People and events 136
Coming events 141

April
News and comment 145
Nuclear structure theory by J M Irvine 149
The float glass process by H Charnock 153
Technological forecasting by P D Wilmot 156
Intense magnetic fields by E W Lee and D Melville 159
The Fulmer Research Institute by W E Duckworth 166
Book reviews 174
Highlights of recent meetings 176
Technology in brief by C L Boltz 179
Letters to the editor 181
People and events 183
Coming events 187

May
News and comment 193
The rise of scientific instruments by G L'E Turner 197
The proliferation of electronics by H Sutcliffe 199
Computers and digital measurement by P B Fellgett and G R Whitfield 200
Developments in nuclear instrumentation by J L Lloyd 203
Medical instrumentation by D W Hill 205
Adjustment of telescopes by I G van Breda 207
Sound and vibration research by P O A L Davies 209
Book reviews 218
Highlights of recent meetings 220
The 1970 Physics Exhibition 222
Technology in brief by C L Boltz 224
Letters to the editor 227
People and events 230
The register 234
Coming events 237

June
News and comment 241
The Mössbauer effect 246
Introduction by D A O'Connor 246
Application to diffusion phenomena and molecular dynamics by D C Champeney 248
Application to biological molecules by G Lang 250
Applications to metallurgy by C E Johnson 253
Applications to relativity by G R Isaak 255
Chemical applications by N N Greenwood 258
Ancient Chinese astronomical records by Ho Peng Yoke 260
Bioengineering: models of the ear by J K Cannell 264
Book reviews 270
Technology in brief by C L Boltz 274
Highlights of recent meetings 276
Letters to the editor 278
People and events 281
Coming events 285

July
News and comment 289
Universities and the community by M R Gavin 292
Training of medical physicists by R E Ellis 298
Nuffield advanced physics by P J Black and J M Ogborn 301
International scientific cooperation by P E Hodgson 304
Digital storage technology by W Renwick 306
Book reviews 317
Highlights of recent meetings 319
Technology in brief by C L Boltz 322
Letters to the editor 324
People and events 326
The register 331
Coming events 333

August
News and comment 337
Nonlinear optics by R C Smith 341
The solid ground of nature by A H Cook 345
Galaxy: a new era in astronomy by V C Reddish 351
X-ray absorption 75 years later by J H Hubbell 353
Book reviews 363
Technology in brief by C L Boltz 369
Highlights of recent meetings 371
Letters to the editor 373
People and events 375
Coming events 379

September
News and comment 385
Heavy ion nuclear physics by B W Hooton 389
Field ion microscopy by D A Smith and G D W Smith 393
Harnessing biological energy by O Z Roy 401
Noise and buildings by W E Scholes 403
On writing scientific papers by P C Wason 407
Book reviews 414
Simon Memorial Prize 1970 by N Kurti 418
Highlights of recent meetings 419
Technology in brief by C L Boltz 420

Letters to the editor 422
People and events 423
The register 427
Coming events 429

October

News and comment 433
The production of low temperatures by M J Lea 436
Rocks, water and oil by R W Goodley 442
The employment of physicists by D Hutchings 446
Man's need for machine slaves by M W Thring 449
Science teaching at the Open University by M J Pentz 452
Book reviews 460
Highlights of recent meetings 465
Technology in brief by C L Boltz 466
Letters to the editor 468
People and events 470
Coming events 475

November

News and comment 481
Defect centres for information storage by M J Taylor 485
Coherent light and refractive index fields by M J R Schwar and F J Weinberg 490
Kinoforms by J A Jordan, P M Hirsch and L B Lesem 493
Employment of physicists in industry by D Hutchings 495
Explosives for welding by B Crossland 498
India's scientific development by D L Gosling 503
Book reviews 510
Highlights of recent meetings 514
Technology in brief by C L Boltz 516
Letters to the editor 519
People and events 520
Coming events 525

December

News and comment 529
Physics 1970: a survey 532
The Institute and Society in 1970 544
Industrial robots and machine intelligence by J R Parks and D A Bell 549
Book reviews 558
Technology in brief by C L Boltz 561
Highlights of recent meetings 563
People and events 568
Coming events 571
The register 574

Printed in Great Britain by Alden & Mowbray Ltd at the Alden Press, Oxford

Indices

Subject index

Appreciations

Born M 137
Harrison G B 327
Holm Ragnar 231
Jones J C 231
Owen D 137
Smith T 87

Articles

Are you experienced? 104
Astronomical records and their modern applications, Ancient Chinese 260
Atomic structure 53
Bachelors, The new 112
Bioengineering: Models of the ear 264
Biological energy, Harnessing 401
Biological molecules 250
Chemical applications of the Mössbauer effect 258
Choosing astronomy 112
Coherent light sources and refractive index fields 490
Cooperation 111
Defect centres in solids for information storage and display 485
Development in nuclear instrumentation 203
Diffusion phenomena and molecular dynamics, Applications of the Mössbauer effect to 248
Digital measurements and the use of computers 200
Digital storage technology, Review of 306
Electronics, The proliferation of 199
Electron ring accelerator, The 6
Employment of physicists in the 1960s, The 107
Employment outlook for physicists in the 1970s, The 109
Experiment in international scientific cooperation, An 304
Experientia docet: the rise of scientific instruments 197
Explosives for welding 498
Field ion microscopy 393
Float glass process, The 153
Fulmer Research Institute, The 166
Future, Into the 101
GALAXY: a new era in astronomy 351
Heavy ion nuclear physics 389
High power pulsed lasers 116
I am a woman with a physics degree: Where do I go from here? 105
India's scientific development, Planning for 503
Industrial robots and machine intelligence 549
Institute and Society in 1970, The 544
  Developments in IPPS affairs 544
  Meetings and conferences 545
  Membership and education 546
  Physics exhibition 545
  Publications 548
Intense magnetic fields and the magnetic properties of solids 159
Job hunting in 1969 106
Kinoforms 493
Low temperatures, Recent advances in the production of 436
Machine slaves, Man's need for 449
Medical instrumentation 205
Medical physicists, The training of 298
Metallurgy, Applications of the Mössbauer effect to 253
Microelectronics 60
Mössbauer effect, The 246
Nobel Prize in physics, The 1969 22
Noise and buildings 403
Nuclear structure theory 149
Nuffield advanced physics course, The 301
Open University, Science teaching at the 452
Optics, Nonlinear 341
Physicist at sea, The 66
Physicists 1968–69, The employment of newly qualified 446
Physicists in industry, Employment of 496
Physics 1970: a survey 532
  Bands at high pressure 536
  Containing hot plasmas 538
  Devices for acoustics 542
  Films and surfaces 537
  Hydrogen, the end in sight? 532
  Iconography and tectology 538
  Implantation and voids 535
  Learning about carbon 540
  Methods of analysing stress 541
  Monopoles and magnetic bubbles 540
  Spectroscopy 532
  Spin flip lasers and phase transitions 535
  Squids and microkelvins 539
  Static electricity 541
  Structure of the nucleus 534
  The year in space 535
Physics Exhibition: Preview, The 1970 54
Physics graduate in industry, A 107
Physics in Scotland 10
Physics student, Organizing the 102
Postdoctoral physics in the United States 115
Projects at Surrey 110
Relativity, Applications of the Mössbauer effect to 255
Rocks, water and oil 442
Scientific papers, On writing 407
Solid ground of nature, The 345
Sound and vibration research 209
Structure and mechanical properties of solid polymers, The 71
Technological forecasting 156
Technology in brief 31, 132, 179, 224, 274, 322, 369, 420, 466, 514 561
Telescopes, Adjustment of 207
Universities and the community (Presidential Address) 292
Uranium enrichment 17
VSO in Africa 114
What the students are up to 103
X-ray absorption 75 years later 353

Comment

Big machine, A home for the 97
CERN rides again, Super- 241
Dr Elizabeth Laverick for Council 385
Economic union, Towards real 194
Electronics imports too high 242
Environment, Technology and the 483
EPS approves British physics journals 1
Europe needs the UK 481
Fundamental research in Europe 340
Graduate physicists in industry 2
Haslegrave Report on Technician Courses and Examinations: an Institute and Society view, The 244
Institute and Society study group on examinations 4
IUPAP news 195
Lisson Gallery, At the 148
Lord Kelvin, Commemorating 531

Materials research at Penn State 338
Palliatives, More 50
PhDs, What to do with the 100
Physics exhibition, Open forum at the 148
Physics journals of the future 241
Pressing needs in school science 387
SCOPE 148
Sixth form curricular reform 52
Size the answer for industry?, Is 385
Space race?, Are we in the 433
Squeezing the universities 99
SRC and the engineers 97
SRC and university research 193
University centres for cooperation with industry 99
Women in science 98

Conference, meetings and exhibition announcements

Accelerator and space radiation 522
Acoustics and vibrations 231
Activation analysis 329
Active reactors 282
Adsorption–desorption 473
Advanced programming systems 282
Aircraft noise 570
American Physical Society 376
Analysis instrumentation 138
Antennae and propagation 524
Artificial intelligence 474
Astronautics 427
Atomic and molecular physics 87, 569
Atomic energy, Peaceful uses of 523
Automatic control 328
Autumn days congress 186

Band structure in solids 376
BCURA open days 233
Bearings chemistry 377
Biomedical computing 474
Biomedical engineering 137, 378
Biophysics 327, 472
Bubble chambers, Ultrasonic 570

Calorimetry 283
Careers – where and how 426
Cements, Constitution and structure of 328
Ceramics 282
Ceramics, fibres and composites 522
Chemical applications of laser Raman spectroscopy 138
Chemical nuclear data 425
Chemists' autumn meeting 329
Chemists' meeting 427
CODATA conference on numerical data for science and technology, The second international 42
Collisions in solids 523
Combinatorial mathematics 186
Computational physics 87
Computers and automata 184
Computer education 40
Computers in chemical engineering, The third European symposium on the use of 42
Computers in research 89
Computers in undergraduate science education 233
Concrete, Nondestructive examination of 426
Conduction in low mobility materials 232
Contract research, Innovation through 524
Controlled fusion and plasma physics 184
Cryogenic engineering conference, The 1970 42
Cryogenic engineering conference and exhibition, The third international 41
Cryogenics 327
Crystal growth 40, 138
Crystal growth and epitaxy from the vapour phase 88
Crystal structure 523
Cyclotrons 376

Deformation and fracture of soft polymers 42
Designing for plastics: the integrated approach 42
Determination of electronic energy levels: the new spectroscopic techniques 282
Dielectric Discussion Group 40
Discharges and electrical insulation in vacuum 87
Displays 377
Dynamic studies with radioisotopes in clinical medicine and research 41

Earth and planets 474
Earth station technology 138
Elastomers and polymers 184
Electrical interference in instrumentation 42
Electrical safety in hazardous environments 139
Electric circus 233
Electricity distribution 139
Electroceramics 88
Electrochemical engineering 377, 524
Electrochemistry 89
Electrochemistry, Biological aspects of 524
Electrochemistry of surfaces 524
Electron energy analysis 570
Electronic components 472
Electron, ion, and laser beam technology 569
Electron microscopy 138, 473, 569
Electron spectrometry 425
Electro-optical systems design 88
Elementary particle physics 282, 522, 570
EMCON 72 471
Environmental engineering 474
Environmental pollutants, Identification and measurement of 233
European high pressure research group 40

Film festival, 1971 British industrial 524
Flow measurement 523
Flow measurement and control 474
Fluid sealing 523
Foratom 427
Force and weight 522
French Centre for Science and Technology of Building open day 233
Frequency control 570

Gallium arsenide and related compounds 39
Gas discharges 281
Geology in universities, The teaching of 232
Geophysics 425, 522
Geoscience assembly 328
German physicists' conference 283
German physics 472
Gravimetry 329

Hadron physics 472
Hadron spectroscopy 327
Hardness testing in theory and practice 283
Health physics 376
Heat transfer 40
High energy physics 185, 231
High frequency generation and amplification 327
High temperature reactors 426
High temperature reactors using helium as a coolant, Component design for 137
Hospital Physicists' Association 376
Hovercraft conference 233
Hyperfine interactions detected by nuclear radiation 138

IAEA conferences 184
IAU 376
IAU assembly 327
IAU meetings 138
IEEE events 377
IEE in 1972 523
IEE, 100 years of 328
Industrial electronics 282
Industrial films 140
Industrial photography 89
Information processing 328
Information science 524
Information technology 569
Infrared techniques 522
Innovative metrology, the key to progress 232
Inorganic trace analysis 282
Instrumentation, systems and automatic control 328
International science, research and technology exhibition and conference, The 232
International scientific information 138
Ionic crystals, Colour centres in 523
Ion implantation 136, 282
ITEX 70 89

Journées de physique 377
Journées métallurgiques 426

Laboratory instruments, apparatus, equipment and supplies 42
Light scattering in solids 377
Low energy electron diffraction and scattering 231

Machine tools 89
Magnetic resonance 570
Magnetic resonance and related phenomena 89
Magnetism 425, 522
Magnetism and magnetic materials 282
Magnetohydrodynamics 328
Man–computer interaction 87
Materials research 328
Mathematics, Teaching 473
Mechanisms 184
Megavolt electron microscope 524
Metal insulator and narrow energy bands 522
Metals and alloys, Strength of 376
Metals and plastics in construction and fabrication 89
Metals and the motor car 89
Metastable metallic alloys 88
Meteorology 474
Metric studies 328
Micro 70 89
Microscopy for teachers 328
Microwave and laser instrumentation 426
Microwave and optical generation and amplification 40
Microwaves 523
Molecular beams 570
Molecular structure and spectroscopy 283
Multiphase fluids 522
Multivariable control 524
Multivariable control systems 328

Nato advanced study institutes 139
NELCON 70 convention, The 231
Neutron cross sections 523
New fibres and textiles 232
Noise and vibration 523
Noncrystalline solids 376
Nuclear gas turbines 40
Nuclear physics 522
Nuclear power 186
Nuclear power stations, Environmental aspects of 185
Nuclear science 425
Nuclear systems environment 425
Nuclear techniques in the measurement and control of environmental pollution 184
Nuclei and particles 425

Oceans, Exploiting the 473
Open days at Chilton 282
Open days at NEL 329
Optical Society of America 41
Optimization techniques in circuit and control applications 185
Organic solids, Electrical conduction in 569

Peaceful atom, the 427
PERA on materials 89
Physics and its teaching 41
Physics at work 425
Physics conferences in France 40
Physics teaching 425
Plasma physics 522
Plasma physics and nuclear fusion 570
Plasma physics in chemical synthesis 87
Plastic pipes 283
Plastics 329
Plastics and rubbers 284
Plutonium and other actinides, The fourth international conference on 41
Pollutants in chimneys, The measurement of air 233
Pollution prevention 474
Polymers 426
Polymers, Anisotropy in 184
Polymer structures and properties 137
Powder technology 328, 377
Power instrumentation 523
Power reactors 186
Power system protection and metering, Application of computers to 184
Practical aids to research management 42
Pressure seals 139
Process control 328
Process instrumentation in the metal industries 42
Programming projects, Large 426

Quantum electronics, Joint council on 40

Radiation and radioisotopes 523
Radiation biology 377
Radiation, Control by 570
Radiation detectors 328
Radiation effects in semiconductors 88
Radiation induced voids 376
Radioactive laboratories 282
Radiological protection 426
Radionuclides and radioprotection 523
Raman spectroscopy 88
R and D and conservation 473
R and D Society 472
Rare earths and actinides 569
RAS, Joint meetings with 472
Reactive solids 523
Reactor meeting 425
Recovery and recrystallization 426
Reinforced thermoplastics 426
Relaxation phenomena and mechanical properties of polyvinyl chloride 41
Research planning 186
Residual gases 472
Rheology in solids 41
Rheology, Theoretical 474
Royal Society 472

Safety in x-ray laboratories 376
Scanning electron microscopy 138, 473
Science and civilization 377
Science congress 569
Semiconductors, Amorphous and liquid 473
Shock tubes 231
SIAM 1970 233
Side-scan sonar 569
Sira 1970 184
Sliding and deformation 425
Soil science 524
Solar eclipse 427
Solid state conference 471
Solid state devices 39, 281
Solid state sensors 87
Solid state, The 425
Solid surfaces 569
Space and communications 473
Space optics 137
Special ceramics 89
Spectral lines in gases and plasmas, The broadening of 39
Spring meetings, German 569
Static electrification 471
Static electricity 41
Statistical mechanics 569
Stress analysis today 186, 231
Structural aspects common to synthetic and biological macromolecules 138
Structural vibrations 570
Surface physics and ultrahigh vacuum science and technology 87
Surface, vacuum and space 472

Teaching, Goup discussions in 473
Technological exchange 426
Temperature symposium 184
Textile physics 39, 472
Thermal analysis 377
Thermal conductivity 232
Thermal expansion of solids, The second symposium on 41
Thermophysical properties 137
Thin films 138
Thin films, Structure and growth of 376
Thin liquid films and boundary layers 232
Trace analysis 282
Tribology conference 185
Trunk telecommunications by guided waves 186

Ultrasonics for industry 232
Unconstrained optimization 474
Upper atmospheric currents and electric fields 327
Uranium recovery 88

Vacuum coatings conference 233
Vacuum conference, Spanish 472
Vacuum equipment 327
Vacuum technology 327

Women engineers' and scientists' conference 232

X-ray analysis 88

Yield, deformation and fracture in polymeric materials, Physical and structural basis of 39

Conferences and meetings, highlight reports

Accelerators, Low energy 371
Atomic collision phenomena 34
Atomic physics 465
Bigger and better cyclotrons 33
Clean surfaces 35
Composite materials testing 517
Computers in physics education 278
Ferrite materials 518
French Physics Exhibition, The 220
Generation of microwaves 277
High energy physics 563
High temperature transducers 177
Instrumenting boilers 221
International scientific information 465
Light from gas discharges 320
Microwave spectroscopy 419
Navy visit 419
Nonlinear optics 34
Nuclear physics, Low energy 321
Nuffield advanced physics 564
Photoionization and photoelectron spectroscopy 565
Physics Exhibition, The 1970 222
Physics within a science centre 321
Plasma physics school 465
Polymer physics in Britain 33
Science of materials 176
Solidification and crystal growth 177
Solid state devices 566
Solid state physics 176
Spectroscopic techniques 565
Spectroscopy of polymers 220
Sputtering 518
Stress analysis in hostile environments 178
Techniques of stress analysis 276
Thick film microelectronics 319
Ultrasonic testing, Modern trends in 276
Yield, deformation and fracture of polymers 319

Courses and lectures, details

Acoustic and vibration technology 233
Aerodynamics course 378
Application of microscopy to polymers, The 90
Applied optics 186
Calibration techniques 378
Courses for teachers 329
Crystal growth 524
Data communications 427
Enrico Fermi courses 90
Extraction and refining 427
Fluid mechanics, The interaction between experiment and theory 90
Health physics 474
Industrial safety 284
Magnetism (current topics) 140
Metals in aerospace 426
Molecular biology and radiobiology 233
Nondestructive testing 378
Nuclear propulsion 425
Nuclear theory course 329
Radiation protection 90, 284
Research instrumentation 139
Royal Institution lectures 90
Science, economic growth and the quality of life 140
Science information 472
Social implications of science 524
Space experiment technology 473
Static electrification 284
Summer schools 1970 284
Theoretical chemistry 90
Tribology courses 524
Value engineering 378

Institute and Society affairs

Annual Dinner and Soirée 1970 329
Annual General Meeting, Ninth 232
Annual Representative Meeting 330
Atomic Collisions in Solids Group 232
Binding Physics Bulletin 42
Branch office in Bristol 140
Despatch of Physics Bulletin 140
Elections to Council 377
Fees and subscriptions, Annual 140, 524
Fulmer technical services 147
Holweck Medal and Prize 184, 233
ICRU Gray Medal 186
Institute and Society awards for 1970 84
Institute and Society 1971 awards 473
Institute and Society GIRO account 90
Journal of Physics C: Solid State Physics 186
Journal of Physics Letters 42
Journal of Physics on microform 140
Members, News of 38, 86, 136, 183, 230, 281, 326 375, 423, 470 520, 568
Nominations for 1971 awards 283
Nominations for members of Council 185
Nondestructive testing 186
Notes for the physicist 234, 284, 330, 378
Physics courses 1970/71 90, 140
Physics Exhibition 1970 186
Polymer physics 377
Publications, Institute and Society 88
Refereeing of research papers 2
Register 95, 234, 331, 427, 574
Reports on Progress in Physics 140
Review of Physics in Technology 427
Secretary's column 3, 99, 195, 291, 339, 483
Simon Memorial Prize 184, 418
Standing Committees, Institute and Society 38
Students and the Institute and Society 243
Subscription rates: 1971 journal 378
Supplementary publications scheme 186
Tax relief 140
University physics research 140

Letters to the editor

Amateurism, The value of 280
Antidazzle device 374, 469
Astrophysics 83
British scientists before 1914 36
Car aerodynamics 135
CERN rides again, Super- 373
Computational Physics Group 82
Conjecture on inner product spaces, A 280
Curricular reform, Sixth form 227, 278, 325
Defining physics 36, 134, 228, 374
Degree standards 325, 469
Digital storage technology 422
'Doers', A better chance for 82
Electron ring accelerator, The 135
Electrostatics? A fallacy in 519
Engineering physicists 181
Fluid mechanics 37
Food for thought 373
Gallium arsenide devices 325
GaAs vapour phase epitaxy 182
Girls do like physics 469
Glass and glaze 280
Kilogram molecular weight, The 37, 83, 229
Lasers or microwaves 280
Magnetics in the UK, Applied 229
McGee Spectracon, The 373
Microelectronics 182
More girls to come? 229
Nuffield advanced physics 422
Pattern recognition 36
PhD? Who's for a 227
Physicists, Jobs for 82
Physics centres in London 83
Physics Exhibition preview 182

Physics Exhibition, 1970 227
Physics in Nigeria 324
Physics in school 228
Physics in Scotland 135
Poynton F Y 422
Projects at Surrey 280
Pulse thermocouple, The 37
Science at the universities 422
Sheep and goats 181
Stephens, R W B retires 182
Subscriptions, Members' 468
Supply of qualified people 229
Technological forecasting 279
Universities and the community 468, 519

News items

Academic awards 291
Accelerator on the move 337
American physics 3
Apollo and Europe 145
Astrophysics fellowships 484
Brain drain from Europe 291
Canadian graduates, Survey of 484
Car wear and weaknesses 100
CEI reports 290
Centrifuge agreement 51
Coming events 43, 91, 141, 187, 237, 285, 333, 379, 429, 475 525, 571
Computer Board Chairman, New 289
Computer industry, A European 145
Computer men's code 145
Consultation 243
Crystallography in Britain 98
Dielectric work functions 4
Electron and photon interactions at high energies 140
Engineering views 340
Engineers at Westminster 147
Engineers' training 4
Environmental news 339
European molecular biology 243
European register of engineers 289
European revival 49
European technological collaboration 4
Fusion in Europe 337
Fusion research, World 435
German medical physics 291
Girls do like physics 340
Holography and metrology 101
How to move a church 5
IC Optical Systems Ltd 385
IEE subscription rates 90
Infrared Engineering Ltd 484
Inspec topics 435
Instrument awards 434
Laser systems – code of practice 90
MacRobert Award 90
Magnetic tape standards 531
Managing technology 338
Materials, Advisory council on 241
Molecules in space 243
Nondestructive testing 140
Nuclear fuel for Europe 147
Nuclear information 5
Ocean technology, Cooperation in 193
Patents for the future 388
PhDs in employment 290
Physicists in Germany 100
Physics program library 4
Plasma physics, Glossary of 140
Pollution commission 147
Polymer science supported 339
Programming certificate 243
Quality of life, The 49
Radioactivity standards 140
Reorganizing science in Germany 53
Research grants 531
Royal Society and education, The 100
Scientists in residence 291
Scottish Branch, Structure of the 435
SRC, New members 484
SRC postdoctoral awards 147
Summer reading 435
Trade union membership 51
University expansion 290

Reports reviewed

Annual Statistical Survey of the Electronics Industry 434
Britain and the European Communities: An Economic Assessment 145
Britain in Europe: A second Industrial Appraisal 145
Committee on Tribology Report 1968–69 196
Economic Assessments to 1972 193
Differential Equations Panel Report 146
Effective Use of Government Research and Development Resources 289
Federal Funds for Research, Development and Other Scientific Activities, Fiscal Years 1968, 1969 and 1970 Vol 18 196
Finance and Awards 98
First Employment of University Graduates 1967–68 195
Further Education and the Technologist 147
Graduate Training in Manufacturing Technology 433
106th Annual Report on Alkali, &c. Works 1969 433
Industrial Research and Development in Government Laboratories 97
Industry, Science and Universities 387, 434
Information Retrieval in the USA 147
Inventions, Profit from 481
Ion Implantation Panel Report 146
IPPS Annual Report for 1969 195
Labour Losses in the Electronics Industry 339
Metrication in Britain 289
New Policies for Public Spending 530
Public Expenditure 1968–69 to 1973–74 50
Report of the Committee on Technician Courses and Examinations 53
Reports on Progress in Physics 340
Review of Physics in Technology 340
Review of the Physics Committee 1
Second Report of the Computer Board 529
Science Research 1969–70 481
Select Committees of the House of Commons 530
Selectivity and Concentration in Support of Research 337
Software Protection 482
Statistics of Education 1968 Vol 5 98
Statistics of Science and Technology 1970 529
Strategies for Displaced Employees 50
Teacher Training for Science and Mathematics Graduates 196
Teaching Computing in Universities 482
Technicians in Research and Development 51
Technology: Processes of Assessment and Choice 1969 3
The Invisible University: Postdoctoral Education in the United States 5
The Physics of Amorphous Materials 386
The Policies and Activities of the Mathematics Committee 386
The Reorganization of Central Government 530
The Shortage of Mathematics and Science Teachers in Schools 49
The Survey of Professional Engineers 242
The Survey of Professional Scientists 1968 242
Universities in the 1970s 388
University Grants Committee Annual Survey 1968–69 98

Author index (with titles)

ALLEN J E Science at the universities (L) 422
ANDREWS E H Polymer physics 319
ASTBURY N F Food for thought (L) 373
AUGHTIE F A fallacy in electrostatics? (L) 519
AUGHTIE F An antidazzle device (L) 469
AVERY D G Uranium enrichment 17

BAKER-SELF T P J Sheep and goats (L) 181
BARRETT R C and JOHNSON R C Nuclear physics 321
BEALE J R A Microelectronics 60
BECKMANN G Sheep and goats (L) 181
BELL D A and PARKS J R Industrial robots and machine intelligence 549
BIDEN M J Are you experienced? 104
BIRTWISTLE D Jobs for physicists (L) 82
BLACK P J and OGBORN J M The Nuffield Advanced Physics Course 301
BLACK P J and WILTSHIRE A S Nuffield Advanced Physics (L) 422
BLITZ J Modern trends in ultrasonic testing 276
BLOOD B E The new bachelors 113
BOARDMAN J A physics graduate in industry 107
BOLTZ C L Navy visit 419
BOLTZ C L Physics Exhibition: Preview, The 1970 54
BOLTZ C L Physics in Scotland 10
BOLTZ C L Technology in brief 31, 132, 179, 224, 274, 322, 369 420, 466, 514, 561
BRADLEY D J High power pulsed lasers 116
BRADSHAW A GaAs vapour phase epitaxy (L) 182
BRUCE C E R Astrophysics (L) 83

CAFFYN J E Materials research at Penn State 338
CANNELL J K Bioengineering: Models of the ear 264
CAWTHORNE R G Nuffield advanced physics 564
CAYLESS M A and NELSON E H Light from gas discharges 320
CHAMBERLAIN J Spectroscopic techniques 565
CHAMPENEY D C Applications to diffusion phenomena and molecular dynamics 248
CHARNOCK H The float glass process 153
CHILTON L V G B Harrison – an appreciation 327
CLARKE J Postdoctoral physics in the United States 115
COLES B R IPPS 1970: Meetings and conferences 545
COLLIGON J S Atomic collision pheonomena 34
COLLIGON J S Sputtering 518
COOK A H The solid ground of nature 345
COPLEY G N Kilogram molecular weight, The (L) 83
CORNEY A Atomic physics 465
CROSSLAND B Explosives for welding 498

DALITZ R H The 1969 Nobel Prize in physics 22
DANBY P C G Physics Exhibition preview (L) 182
DAVIES P O A L Sound and vibration research 209
DEACON G E R Physicist at sea, The 66
DE BARR A E IPPS 1970: Membership and education 546
DISNEY C M I am a woman with a physics degree: where do I go from here? 105
DOBBS E R Physics 1970: Devices for acoustics 542
DOBBS E R Physics 1970: Squids and microkelvins 539
DONNACHIE A High energy physics 563
DUCKWORTH W E The Fulmer Research Institute 166
DUNCUMB P Technicians in research and development 51

EDWARDS D F A Physics 1970: The year in space 533
EDWARDS R A Defining physics (L) 134, 374
EDWARDS S F IPPS 1970: Publications 548
ELLIS R E The training of medical physicists 298
ELTON L R B Pressing needs in school science 387
ELWELL D and PEARSON R F Ferrite materials 518

FELEKI L Into the future 101
FELLGETT P B and WHITFIELD G R Digital measurement and the use of computers 200
FIRTH A Dr Elizabeth Laverick for Council 385
FIRTH A Open Forum at the Physics Exhibition 148
FIRTH A What the sudents are up to 103
FLOWERDAY P L The employment of physicists in the 1960s 107

GALE R W Thick film microelectronics 319
GAVIN M R Universities and the community 292
GAVIN M R Universities and the community (L) 519
GIBBINGS J C Car aerodynamics (L) 135
GOODIER J Sixth form curricular reform 52
GOODLEY R W Rocks, water and oil 442
GOSLING D L Planning for India's scientific development 503
GREENBANK L R Science of materials 176
GREENWOOD N N Chemical applications 258

HABELL K J T Smith – an appreciation 87
HADLEY D W Polymer physics in Britain 33
HARRISON R D Training technicians 53
HEAVENS O S and PRUTTON M Physics 1970: Films and surfaces 537
HEISENBERG W Max Born – an appreciation 137
HILL C Solid state devices 566
HILL D W Medical instrumentation 205
HIORNS F J Instrumenting boilers 221
HIRD R Organizing the physics student 102
HIRSCH P M, LESEM L B and JORDAN JR, J A Kinoforms 493
HO PENG YOKE Ancient Chinese astronomical records and their modern applications 260
HODGSON P E An experiment in international scientific cooperation 304
HOGARTH C A IPPS 1970: Physics exhibition 545
HOOTON B W Heavy ion nuclear physics 389
HUBBELL J H X-ray absorption 75 years later 353
HUMPHRY R H David Owen – an appreciation 137
HURLE T J Solidification and crystal growth 177
HUTCHINGS D Employment of physicists in industry 496
HUTCHINGS D The employment of newly qualified physicists 1968–69 446
HYDE K V Physics Centres in London (L) 83

ING B Cooperation 111
IRVINE J M Nuclear structure theory 149
ISAAK G R Application to relativity 255

JACKSON D M The McGee Spectracon (L) 373
JERRARD H G Nonlinear optics 34
JIGGINS A H Low energy accelerators 371
JOHNSON C E Applications to metallurgy 253
JOHNSON R C and BARRETT R C Nuclear physics 321
JORDAN, JR, J A, HIRSCH P M and LESEM L B Kinoforms 493

KNOTT R G A Girls do like physics (L) 469
KURTI N Simon Memorial Prize 1970, Professor W Meissner 418

LANG G Biological molecules 250
LAWSON J D Bigger and better cyclotrons 33
LEA M J Recent advances in the production of low temperatures 436
LEE E W and MELVILLE D Intense magnetic fields and the magnetic properties of solids 159
LEE E W Physics 1970: Monopoles and magnetic bubbles 540
LEES J Physics 1970: Bands at high pressure 536
LESEM L B, JORDAN JR, J A and HIRSCH P M Kinoforms 493
LEWIS R Computers in physics education 278
LIPSON H Pattern recognition (L) 182
LLOYD J L Development in nuclear instrumentation 203
LONSDALE DAME KATHLEEN Women in science 98
LOUDON R Physics 1970: Spin flip lasers and phase transitions 535
LOVE H M Clean surfaces 35

MACKAY A L Physics 1970: Iconography and tectology 538
MARSH H Physics 1970: Learning about carbon 540
MARTIN D H and WILKINSON G R Physics 1970: Spectroscopy 532
MCNAMARA B Computational Physics Group (L) 82
MCNEIL M B Degree standards (L) 469
MELVILLE D and LEE E W Intense magnetic fields and the magnetic properties of solids 159
MIDGLEY J W University centres for cooperation with industry 99
MITTON S Choosing astronomy 112
MONTAGUE B W The electron ring accelerator (L) 135
MOORSHEAD B and STREET P Projects at Surrey 110

NELSON E H and CAYLESS M A Light from gas discharges 320
NELSON R S Physics 1970: Implantation and voids 535
NOBLE P J W Microelectronics (L) 182
NOLTINGK B E High temperature transducers 177

O'CONNOR D A The Mössbauer effect 246
OGBORN J M and BLACK P J The Nuffield Advanced Physics Course 301
OWEN N L Microwave spectroscopy 419

PARKS J R and BELL D A Industrial robots and machine intelligence 549
PASCOE K J Techniques of stress analysis 276
PEARSON R F and ELWELL D Ferrite materials 518
PEASE R S Physics 1970: Containing hot plasmas 538
PENTZ M J Science teaching at the Open University 452

PIKE E R The French Physics Exhibition 220
PRESS R IPPS 1970: Developments in IPPS affairs 544
PRICE W C Photoionization and photoelectron spectroscopy 565
PRUTTON M and HEAVENS O S Physics 1970: Films and surfaces 537

RAFFLE J F Engineering physics (L) 181
REDDISH V C GALAXY: a new era in astronomy 351
RENWICK W Digital storage technology (L) 422
RENWICK W Review of digital storage technology 306
ROBERTS R A VSO in Africa 114
ROY O Z Harnessing biological energy 401

SCHOLES W E Noise and buildings 403
SCHWAR M J R and WEINBERG F J Coherent light sources and refractive index fields 490
SEAR R Members' subscriptions (L) 468
SEATON M J Atomic structures 53
SERIES G W Physics 1970: Hydrogen, the end in sight? 532
SHOBERT II, E I Ragnar Holm – an appreciation 231
SIMMONS J A Better chance for 'doers', A (L) 82
SIMS G D and THOMAS S L S Composite materials testing 517
SMITH D A and SMITH G D W Field ion microscope 393
SMITH P J Super-CERN rides again (L) 373
SMITH R C Nonlinear optics 341
SOMERVILLE G M Structure of the Scottish Branch 435
SPENCER D Computational Physics Group (L) 82
STANDLEY K J Physics in Scotland (L) 135
STANLEY P Physics 1970: Methods of analysing stress 541
STANLEY P Stress analysis in hostile environments 178
STOPS D W F W Poynton (L) 422
STREET P and MOORSHEAD B Projects at Surrey 110
SUTCLIFFE H The proliferation of electronics 199
SYED M Plasma physics school 465

TAYLOR B C Generation of microwaves 277
TAYLOR J B Job hunting in 1969 106
TAYLOR M J The use of defect centres in solids for information storage and display 485
TEWARY V K An antidazzle device (L) 374
THOMAS S L S and SIMS G D Composite materials testing 517
THOMPSON N Palliatives for teacher shortage 49
THRING M W Man's need for machine slaves 449
THURSTANS R E Universities and the community (L) 468
TROTT N G J C Jones – an appreciation 231
TURNER D J An antidazzle device (L) 469
TURNER G L'E Experientia docet: the rise of scientific instruments 197

VAN BREDA I G Adjustment of telescopes 207

WALTERS H V The employment of physicists in the 1970s 109
WARD I M The structure and mechanical properties of solid polymers, 71
WASON P C On writing scientific papers 407
WEINBERG F J and SCHWAR M J R Coherent light sources and refractive index fields 490
WHITE O M Physics within a science centre 321
WHITFIELD G R with FELLGETT, P B Digitial Measurement and the use of computers 200
WILKINSON G Spectroscopy of polymers 220
WILKINSON G R and MARTIN D H Physics 1970: Spectroscopy 532
WILLMOTT J C Physics 1970: Structure of the nucleus 534
WILMOT P D Technological forecasting 156
WILTSHIRE A S and BLACK P J Nuffield advanced physics (L) 422
WOHLFARTH E P Solid state physics 176
WRIGHT W D R W B Stephens retires (L) 182

ZICHY E L Physics 1970: Static electricity 541

Book review index

ADAIR R K *Concepts in Physics* 130

BAKER J and HEYMAN J *Plastic Design of Frames* Vol 1 *Fundamentals* 317
BAKER W J *The History of the Marconi Company* 512
BECKER R S *Theory and Interpretation of Fluorescence and Phosphorescence* 365
BEMPORAD M and FERRERE E (Eds) *Selected Topics in Solid State and Theoretical Physics* 30
BENSON F A (Ed) *Millimetre and Submillimetre Waves* 513
BERNOULLI D and J *Hydrodynamics and Hydraulics* 363
BETHE H A and JACKIW B *Intermediate Quantum Mechanics* 2nd Edn 30
BEYER R T and LETCHER S V *Physical Ultrasonics* 364
BLACKMAN D R *SI Units in Engineering* 81
BUCHOLZ H *The Confluent Hypergeometric Function* Vol 15 318
BURGERS J M *Flow Equations for Composite Gases* 367
BURKHARDT H *Dispersion Relation Dynamics* 416
BYRON F W and FULLER R W *Mathematics of Classical and Quantum Physics* Vol 1 367

CALDERBANK V J *A Course on Programming in Fortan IV* 270
CARDONA M *Modulation Spectroscopy* 365
CHADDERTON L T and MCC TORRENS I *Fission Damage in Crystals* 218
CHOQUARD P F *The Anharmonic Crystal* 128
CODATA *International Compendium of Numerical Data Projects* 461
COOPER B E *Statistics for Experimentalists* 510
COOPER W C *The Physics of Selenium and Tellurium* 219

DAVIES J B and RADLEY D E *Electromagnetic Theory* Vol 1 364
DUFFIN W J *Advanced Electricity and Magnetism: For Undergraduates* 174
DYMOND J H and SMITH E B *The Virial Coefficients of Gases* 363

ELLINGER J H *Design Synthesis* Vols 1 and 2 81
EMSLEY J W, FEENEY J and SUTCLIFFE L H *Progress in Nuclear Magnetic Resonance Spectroscopy* Vol 4 272
EMSLEY J W, FEENEY J and SUTCLIFFE L H *Progress in Nuclear Magnetic Resonance Spectroscopy* Vol 5 368

FAIRLEY P *Man on the Moon* 130
FAST J D *Entropy* 2nd Edn 128
FIDELLE J P and RAPIN M *L'Hydrogène dans les Métaux* 364
FINCH C A *An Approach to Technical Translation* 29
FLORY P *Statistical Mechanics and Chain Molecules* 414
FOURNET G *Solid State Electronics* 29
FROISSART M (Ed) *Hyperbolic Equations and Waves* 414
FULLER W, RASHBASS C, BRAGG L and NORTH A C T *Biophysics* 462
FURTH R H *Fundamental Principles of Modern Theoretical Physics* 558

GELTMAN S *Topics in Atomic Collision Theory* 363
GILLOTT G and LOFTUS P *Managing Metrication* 130
GODWIN R P and SCHNAKENBERG J *Springer Tracts in Modern Physics* 511
GRUNBAUM A *Modern Science and Zeno's Paradoxes* 365

HAGE B (Revised by MARTIN D) *An Introduction to Vector Analysis* 366
HAWKES P W *Quadrupoles in Lens Design* 559
HELLWEGE K-H and A M (Eds) *Landolt-Börnstein: Zahlenwerte und Functionen aus Naturwissenschaft und Technik* Vol III/2 414
HELLWEGE K-H and A M (Eds) *Magnetic and Other Properties of Oxides and Related Compounds* 560
HERZ R H *The Photographic Action of Ionizing Radiations* 460
HOWATSON A M *Principles of Applied Electricity* 416
HUTCHINGS D (Ed) *Engineering Science at the University* 513

INTERNATIONAL CONGRESS *The Practical Application of SI Units* 81
INTERNATIONAL UNION OF PURE AND APPLIED CHEMISTRY *Structure of Organic Solids* Vol 18 416

JAEGER J C *Elasticity, Fracture and Flow* 366
JEAN M and RICCI R A (Eds) *Nuclear Structure and Nuclear Reactions* 366
JEFFREYS H *The Earth* 560
JOST R (Ed) *Local Quantum Theory* 558

KNEWSTUBB P F *Mass Spectrometry and Ion–Molecule Reactions* 364
KORTUM G *Reflectance Spectroscopy* 272
KOWALSKI E *Nuclear Electronics* 368

LAMPART M A and MARK P *Current Injection in Solids* 558
LANDSBERG P T (Ed) *Solid State Theory* 462

LEECH J W and NEWMAN D J *How to Use Groups* 29
LINDSAY R B *Lord Rayleigh, the Man and his Work* 365
LINSEN B G (Ed) *Physical and Chemical Aspects of Adsorbents and Catalysts* 559
LIVINGSTON M S *Particle Accelerators: A Brief History* 272
LOCHTE-HOLTGREVEN W (Ed) *Plasma Diagnostics* 270
LOCK W O and MEASDAY D F *Intermediate Energy Nuclear Physics* 513

MALINA F J *Research in Physics and Chemistry* 272
MALMSTADT H V and ENKE C G *Digital Electronics for Scientists* 367
MARGENAU H and KESTNER N R *Theory of Intermolecular Forces* 460
MARGOLIS B and LAMB C S (Eds) *Nuclear and Particle Physics* 273
MARMIER P and SHELDON E *Physics of Nuclei and Particles* Vol 1 271 463
MARSHAK R E, RIAZUDDIN and RYAN C P *Theory of Weak Interactions in Particle Physics* 510
MASON E A and SPURLING T H *The Virial Equation of State* 461
MASSEY H S W *Electronic and Ion Impact Phenomena* Vol 2 *Electron Collisions with Molecules–Photionization* 318
MASSEY H S W and BURHOP E H S *Electronic and Ion Impact Phenomena* Vol 1 *Collisions of Electrons with Atoms* 318
MATZ G *Kristallisation (Grundlagen und Technik)* 415
MCCARTHY I E *Nuclear Reactions* 560
MEYER-EPPLER W (Revised by HEIKE G and LOHN K) *Grundlagen und Anwendungen der Informationstheorie* 2nd Edn 510
MOLLENSTEDT G and GAUKLER K H (Eds) *Fifth International Congress on X-ray Optics and Microanalysis* 416
MONTGOMERY D B *Solenoid Magnet Design* 417

NEUGEBAUER O *The Exact Sciences in Antiquity* 368

OGORKIEWICZ R M (Ed) *Engineering Properties of Thermoplastics* 174

PAIN H J *The Physics of Vibrations and Waves* 128
PAUL E B *Nuclear and Particle Physics* 460
PEARCE WILLIAMS L (Ed) *Relativity Theory: Its Origins and Impact on Modern Thought* 270
PEKASHEN M I and TRIFONOV E D *Applications of Group Theory in Quantum Mechanics* 317
PORTER R *Gas Chromatography in Biology and Medicine* 363
PRADAL J *The Literature of Science Popularization* 558
PRATT W K *Laser Communications Systems* 174
PROHOROV YU V and ROZANOV YU A *Probability Theory* 415

RONBINE E *Mathematics Applied to Physics* 512
ROOS B W *Analytic Functions and Distributions in Physics and Engineering* 417
ROSE-INNES A C and RHODERICK E H *Introduction to Superconductivity* 219
ROSEN G *Formulations of Classical and Quantum Dynamical Theory* 463
ROUSE C A (Ed) *Progress in High Temperature Physics and Chemistry* Vol 3 511
ROYAL SOCIETY *Selected Lectures of the Royal Society* Vol 2 318

SAGDEEV R Z and GALEEV A A *Nonlinear Plasma Theory* 218
SANDERS J H and STEVENS K W H (Eds) *Progress in Quantum Electronics* 463
SCHEINMAN P (Ed) *An Introduction to Spectroscopic Methods for the Identification of Organic Compounds* Vol 1 559
SMITH H M *Principles of Holography* 218
SOLVAY CONFERENCE 1967 *Fundamental Problems in Elementary Particle Physics* 511
SPARKES J J *Transistor Switching and Sequential Circuits* 461
STACEY JR, W M *Space–Time Nuclear Reactor Kinetics* 464

TAYLOR B N, PARKER W H and LANGENBERG B M *The Fundamental Constants and Quantum Electrodynamics* 366
TEBBLE R S *Magnetic Domains* 273
TER HAAR D (Gen Ed) *L D Landau II* 510
TERZIAN Y (Ed) *Interstellar Ionized Hydrogen* 174
TOUSIMIS A J and MARTON L *Electron Probe Microanalysis* 462
TOWNSEND B *PAL Colour Television* 414
TURNER W E *et al Many-Body Problems* 29

VON FOERSTER H and BEAUCHAMP J W *Music by Computer* 130

WARREN B E *X-ray Diffraction* 510
WASER P G and GLASSON B (Eds) *Radioactive Isotopes in Pharmacology* 462
WAUGH J S *Advances in Magnetic Resonance* 559
WEAST R C (Ed) *Handbook of Chemistry and Physics* 50th Edn 460
WEEKS T C *High Energy Astrophysics* 462
WHEATLAND D F *The Apparatus of Science at Harvard 1765–1800* 131
WOODFORD P F *Scientific Writing for Graduate Students* 129
WOOLFSON M M *An Introduction to X-ray Crystallography* 414

ZABUSKY N J (Ed) *Topics in Nonlinear Physics* 317
ZEMANIAN A H *Generalized Integral Transformations* 317
ZIMAN J M *The Physics of Metals* Vol 1 *Electrons* 270

21
70

BLANK PAGE

BLANK PAGE